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MECHANICS.

236. Proposed by G. B. M. ZERR, A. M., Ph. D., Philadelphia, Pa.

A simple beam length $2a$, supported at the ends, is loaded with c pounds per running foot at the ends and increases uniformly to the center, where it is b pounds per running foot. Find deflection at center due to this load.

237. Proposed by C. N. SCHMALL, 604 East 5th Street, New York.

In a naval action an officer observes that in the case of two guns firing, at elevations α and β , respectively, the projectile of the former falls a feet short of the target while that of the latter lands b feet beyond. The initial velocity being the same in both cases, prove that the *true* elevation is

$$\frac{1}{2}\sin^{-1}\left[\frac{a\sin 2\beta + b\sin 2\alpha}{a+b}\right].$$

(Suggested by problem 29, page 219, Jeans' *Theoretical Mechanics*.)

NUMBER THEORY AND DIOPHANTINE ANALYSIS.

168. Proposed by A. H. HOLMES, Brunswick Maine.

Find integral values for x , y , u and v from the following:

$$uv - xy = 25x + 29y + 29u + 29v - 112.$$

$$3v - 5u + 5y - x = 102.$$

$$4y - 3v = 419.$$

169. Proposed by R. D. CARMICHAEL, Princeton University.

Let $Q_n(x) = 0$ be the equation whose roots are all the primitive n th roots of unity without repetition. In $Q_n(x) = 0$ replace x by α/β , a fraction in its lowest terms, and clear of fractions. Let $Q_n(\alpha, \beta)$ represent the resulting first member. Set $n = mp$ where p is the largest prime factor of n . It is required to find all the integral values of α, β, m, p satisfying the following relations:

$$(1) \quad Q_m p(\alpha, \beta) = p,$$

$$(2) \quad \alpha^m - \beta^m \equiv 0 \pmod{p}.$$

One such solution is: $\alpha = 2, \beta = 1, m = 2, p = 3$. (See MONTHLY, Vol. XII, p. 89.)

NOTES AND NEWS.

The next annual meeting of the American Association for the Advancement of Science will be held at Boston during the week beginning December 27. Titles and abstracts of papers intended for the section of Mathematics and Astronomy should reach Professor G. A. Miller, 907 West Nevada Street, Urbana, Ill., before December 15.